

North American Drought Monitor – December 2006

CANADA: Unseasonably warm weather and average to below average precipitation inputs in much of Canada in December contributed to low snow packs over much of the southern prairies and a complete lack of snow in southern regions of Ontario, Quebec and much of the Atlantic region. In contrast, coastal British Columbia and parts of the province's interior received heavy rainfalls or snowfalls, including some record precipitation amounts. This precipitation has alleviated some water supply challenges in the province, re-filling many reservoirs and reducing risk of water shortages for 2007. Drought concerns still exist, especially in the southern Prairies because of low autumn precipitation to replenish soil moisture or increase stream water levels prior to freeze up. Eastern Canada has received above average precipitation throughout much of the region, with the exception of northern Nova Scotia which remains drier than normal, however there are no concerns for drought in the region at this time.

British Columbia (B.C.): Coastal areas of southern B.C. continued to receive abnormally high precipitation inputs in the month of December, caused by a succession of intense frontal storms originating in the Pacific. These storm systems caused flooding along the south coast and on Vancouver Island, and contributed to snow packs being well above normal as of December 31st, 2006, in many areas of the province. Some areas of the southwest experienced over 400 mm (15.75 inches) of precipitation in December. November and December combined for a two month total of over 1,400 mm (55 inches) of precipitation in parts of the southwest. High precipitation inputs over much of the province are expected to mitigate drought conditions. Northeastern and central regions, where near-record dry conditions persisted into the autumn, have great potential for improvements in water supplies due to heavy snow. However, these dry regions will not see benefits from the recent precipitation until spring after snowmelt refills streams and reservoirs. Because many stream and reservoir levels were at record lows when freeze-up occurred, water supplies in the northeastern and central regions remain a concern and will be closely monitored.

Alberta: Southern regions of Alberta continued to be dry in the month of December and experienced unseasonably warm temperatures (up to 5 degrees Celsius above the monthly normal). As a result, dry conditions have persisted in the south with the driest areas being the southeast. In this area, little to no snow cover has resulted in some concerns for spring conditions among the agricultural community. Northwestern regions saw some improvements in moisture conditions with above average precipitation during December. Northeastern parts of Alberta continued to receive below average precipitation resulting in a drought classification change from D0 to a D1. Even with low precipitation inputs, stream flows throughout much of the province are average or greater than average for this time of year.

Saskatchewan: With December receiving minimal precipitation inputs, moisture conditions have remained largely unchanged for the past number of months throughout southern Saskatchewan. Unusually high temperatures prevailed in southern regions of the province, resulting in large areas with no snow cover, causing concern for spring soil

moisture conditions and potential drought conditions in 2007. Surface water supply resources also continue to be a concern in these regions. Many dugouts and streams are dry forcing ranchers to haul water for their livestock. Since much of the precipitation fell in the form of snow and will not be accessible for producers to utilize in the form of water until spring, water supply conditions will not likely improve until spring.

Manitoba: Southern Manitoba remains dry but has shown improvements in moisture inputs. Generally, southern parts of the province received below average December precipitation but a late December snowstorm added significantly to the snow pack. The northern agricultural region of the province also received very little snow until the late December snowstorm and has been classified as abnormally dry (D0). Low soil moisture levels in central agricultural regions at the time of freeze up and below average to average precipitation in November and December has the agricultural community closely monitoring conditions. At this time, there are no immediate concerns for surface water supplies as reservoirs were near capacity in the fall and anticipated runoff should result in favourable spring water levels.

Ontario: Dry conditions continued in December in Northwestern Ontario with little change in surface and soil moisture since November's assessment. Much of the region received well below normal precipitation and some small localized areas received record low precipitation since the beginning of November. Low water conditions have been reported by the province in the Dryden and Fort Frances watersheds. In the northeast, the Wawa watershed (including Hornepayne, Oba, White River White Lake Park and Pukaska areas) is also in a low water condition. Most of southern Ontario in the Great Lakes area has reported normal to above normal precipitation inputs with no concerns over low surface water levels.

Acknowledgements

We acknowledge and thank the following organizations whose reports and assessments are consulted to produce the Canadian portion of the North American Drought Monitor:

AAFC-PFRA District and Regional Offices
Alberta Environment
Alberta Agriculture, Food and Rural Development
B.C Ministry of Environment – River Forecast Centre
Environment Canada
Manitoba Hydrologic Forecast Centre
Natural Resources Canada – Canadian Forest Service
Ontario Ministry of Natural Resources – Low Water Response
Saskatchewan Agriculture, Food and Rural Revitalization
Saskatchewan Watershed Authority

UNITED STATES: During December, four major storms carved destructive paths across the central and western United States, due to snow, ice, and wind. The month opened with a storm underway across the nation's mid-section. Snow blanketed areas from northern Texas into Michigan, while ice accumulations were most significant in the middle Mississippi Valley. On December 14-15, a powerful storm swept into the Northwest, causing extensive wind damage. Finally, the year ended with back-to-back storms from the southern Rockies into the upper Midwest. Both storms, which struck from December 19-21 and 28-31, respectively, produced blizzard conditions on the central High Plains and damaging ice accumulations farther east. The late-month storms caused significant livestock losses on the central High Plains but provided much-needed moisture for winter wheat across the nation's mid-section. In Kansas, the nation's largest producer of winter wheat, the percentage of the crop rated good to excellent, increased from 51 to 57 percent between November 26 and December 31. Oklahoma, typically the second-largest winter wheat producer, noted an increase in the portion of the crop rated good to excellent from 42 to 51 percent during the same period. Farther east, showers provided some drought relief in the southern Atlantic States, while wet conditions developed in the central Gulf Coast region. Elsewhere, monthly precipitation totaled less than 25 percent of normal in the Desert Southwest and a small section of the northern Plains, including western South Dakota, northeastern Wyoming, and southeastern Montana.

Across the contiguous United States, monthly precipitation averaged 2.44 inches, or 62.0 mm (109 percent of the 20th-century mean), representing the 41st-highest December value on record. According to preliminary information provided by the National Climatic Data Center (NCDC), near-record wetness in eight states across the Plains and upper Midwest contrasted with unusually dry conditions in Arizona and ten states stretching from Tennessee to Massachusetts.

Annual precipitation averaged 29.25 inches (743.0 mm)—0.11 inch (2.8 mm) above the long-term mean—across the Lower 48 states, placing 2006 near the middle of the 112-year historical distribution. However, state rankings ranged from top-ten dryness in Florida (third-driest year), Georgia (fifth driest), and South Dakota (fifth driest), to among the ten wettest years on record in nine states stretching from Michigan and Indiana eastward to New Hampshire and Massachusetts.

Following an early-December spell of chilly weather, bitterly cold air retreated into Canada and Alaska. By December 8, however, above-normal temperatures returned to the northern Plains and upper Midwest and continued for the remainder of the month. Unusual warmth spread to the East Coast by December 10 and also persisted through month's end. As a result, monthly temperatures averaged 6 to 12 degrees F (3.3 to 6.7 degrees C) above normal in most locations from the northern Plains into the Northeast. In contrast, near-normal monthly temperatures were observed from the central and southern High Plains westward, except for readings as much as 6 degrees F (3.3 degrees C) below normal in some snow-covered Western valleys.

December's warm finish boosted the nation's monthly average temperature to 37.1 degrees F (2.8 degrees C), 3.7 degrees F (2.1 degrees C) above the 20th-century mean, according to NCDC's preliminary data. It was the fourth-warmest December since 1895, behind only 1939, 1957, and 1933. On a statewide level, it was the warmest December on record in Connecticut, Minnesota, New Hampshire, New York, and Vermont.

Assisted by mild weather across the eastern half of the nation during the last three weeks of December, 2006 edged past 1998 as the United States' warmest year during the 112-year period of record. The nation's annual average temperature of 55.01 degrees F (12.78 degrees C), which was 2.22 degrees F (1.23 degrees C) above the 20th-century mean, topped 54.94 degrees F (12.74 degrees C) in 1998 and 54.91 degrees F (12.73 degrees C) for the number-one position. In addition, every year from 1998-2006 currently appears on the list of 25 warmest years in the United States since 1895, reflecting significant warming on both the national and global scale during the last three decades.

Significant changes in the drought depiction during December included an expansion of abnormal dryness (D0) and moderate drought (D1) in Arizona, southern California, and western and southern Nevada; and the introduction of exceptional drought (D4) in south-central Texas. Abnormal dryness (D0) developed in parts of Alaska, Hawaii, and the central and southern Appalachians. In contrast, major improvements were mostly related to the barrage of storms across the central United States and included the reduction or elimination of dryness and drought from eastern Colorado into western Illinois. In addition, residual dryness was largely eliminated from the central Gulf Coast region.

MEXICO: December was 15 percent wetter than normal with temperatures averaging slightly warmer than normal through all but the far northwest section of the country. The National Meteorological Service of Mexico reported a national precipitation average of 32.4 mm (1.28 inches), compared with an historical average of 28.2 mm (1.11 inches), 1941-2005. Most of the Mexican territory registered temperatures ranging from normal to above the climatic average; however, the northern states, including Chihuahua, Durango, Zacatecas, Aguascalientes and northeastern Sonora, were an exception, where the temperatures were cold enough to allow for some locally heavy snow. A persistent trough of low pressure in northwest Mexico favored the persistent cold weather in this section of the country, but moisture was limited under a northwest air flow originating in the deserts of the southwestern U.S. East of the trough precipitation averaged well above normal across northern and northeastern sections of the country. The split jet stream pattern across Mexico was typical of an El Nino year though the split was occurring farther east than normal and thus the west coast of Mexico missed out on its typical peak in December rainfall

Livestock agencies in Northern Mexico reported serious damage to pastures where snow and ice covered Chihuahua's crops and rangeland; as a result the feeding of livestock was hampered across the western half of the state. On the other hand, the accumulation of snow of up to 60 cm will produce great conditions for rangeland and agriculture in the

spring, assuring good soil moisture reserves. There were no other reports of damage from the snow in this region.

Rainfall in the northeast, Mexican Gulf and Yucatan Peninsula significantly reduced the dry areas in these regions. Thus, the area of moderate drought (D1) moved northward. Also moderate drought conditions (D1) were eliminated along the Gulf of Mexico Coast of central Mexico. Abnormally dry conditions (D0) persevered only in northern Veracruz. Rainfall considerably reduced the D0 and D1 conditions over the Yucatan Peninsula, where only a thin area of abnormally dry conditions persisted south into Quintana Roo State. Even though dry conditions diminished over the state of Chiapas, this region still remains as an area suffering from abnormally dry conditions (moderate drought level, D1). It is also important to mention that, despite abundant rain during the 2006 monsoon season, there is a region of developing dryness (D0) and hydrologic drought over western portions of Jalisco, Nayarit, southern Durango and southern Sinaloa. Similar conditions are observed in northern Sinaloa and southwestern Sonora. Along the border of Sonora, condition ratings ranged from abnormally dry (D0) to severe drought (D2). Northern Baja California continued to experience moderate hydrologic drought conditions and, during December, abnormally dry conditions developed over the southern part of the Peninsula. It is very important to mention the unusual distribution of rainfall in Mexico this month was characterized by a deficit of 80% in the northwest, west and southwest sections of the country, while northern, northeast, eastern and southeastern Mexican Territory registered precipitation anomalies of 265% in Tamaulipas, 237% in Nuevo Leon, 236% in Coahuila, 191% in Campeche, 178% in Veracruz, 175% in Quintana Roo, 171% in Aguascalientes, 169% in San Luis Potosi, 162% in Chihuahua and 134% in Yucatan.